

REMARKS

Claims 1-4 and 7-8 are presently pending in the captioned application with claims 1, 3 and 7-8 currently amended, claims 2 and 4 pending as originally filed and claims 5-6 cancelled without disclaimer or prejudice as to the subject matter contained therein.

Claim 1 has been amended to recite a one-paste photopolymerizable composition containing both a photopolymerization initiator with a polymerizable monomer and further to contain the limitations of canceled claims 5 and 6 directed to the components and ratios of the photopolymerization initiator. Support for the one-paste type composition can be found in the originally filed claim 8.

Claim 3 has been amended to depend from claim 1.

Dependent claim 7 has been amended in conformance with the amendments to the independent claim 1 from which it depends.

Claim 8 has been amended into independent form and recites a one-paste photopolymerizable dental composite resin and contains the limitations of canceled claims 5 and 6.

No new matter within the meaning of § 132 has been added by any of the amendments.

No new claims fees are required by the amendment.

Accordingly, Applicants respectfully request the Examiner to

enter the indicated amendments of Appendix A and allow all presently pending claims.

1. Rejection of Claims 1-8 under 35 U.S.C. § 103(a)

The Office Action rejects claims 1-8 as being unpatentable over EP 0 896 043 ("EP '043"). The Office Action states:

EP'043 discloses compositions for dental use comprising photopolymerization initiators that can be used singly or as mixtures. Photoinitiators disclosed comprise an alpha-diketone and tertiary amine, wherein the amines can be used singly or in combinations, aryl borates and photoacid generator, See paragraphs [0071], [0072], [0078], and [0080]. Halomethyl group-substituted s-triazine derivatives are taught as being useful photoacid generators. The examples disclosed combinations of camphorquinone with mixtures of amines. It would have been obvious to one skilled in the art at the time of the invention to employ a mixture of the photoinitiators disclosed by EP'043. One of ordinary skill in the art at the time of the invention would have been motivated by a reasonable expectation of providing effective photoinitiation for a polymerizable composition, as taught by EP'043. EP'043 teaches photoinitiators corresponding to the photoinitiators set forth in the instant claims and that mixtures of the photoinitiators can be used. It would have been obvious to one skilled in the art at the time of the invention to select an alpha-diketone, such as camphorquinone, in combination with a mixture of an aromatic amine and an aliphatic amine, as shown in the

examples of EP'043. It would have been obvious to one skilled in the art at the time of the invention to include a halomethyl group-substituted s-triazine derivatives photoacid generator in order to take advantage of the acid generated for curing the compositions, as taught by EP'043.

Applicants respectfully traverse this rejection because the Office Action fails to establish all three prongs necessary for a *prima facie* case of obviousness. Specifically, EP '043 fails to teach the presently claimed one-paste composition comprising a polymerizable monomer and a photopolymerization initiator wherein the initiator is made up of an α -diketone compound, an amine compound and a s-triazine compound having a trihalomethyl group as a substituent wherein the amine compound contains an aliphatic amine compound and an aromatic amine compound in a claimed mass ratio range. Instead, EP '043 only teaches a laundry list of possible components for use in unspecified mixtures of widely varying components. Hence, the reference completely fails to teach or motivate one of ordinary skill in the art to make and use the presently claimed four components used in combination with a polymerizable monomer in a one paste composition. Even assuming *arguendo* that a *prima facie* has been established, Applicants rebut the presumption with clear evidence of unexpected results showing

that only the claimed composition results in avoiding an undesirable decrease in polymerizing activity from ambient or environmental light while retaining strength.

Rule of Law

The Federal Circuit held that a *prima facie* case of obviousness must establish: (1) some suggestion or motivation to modify the references; (2) a reasonable expectation of success; and (3) that the prior art references teach or suggest all claim limitations. *Amgen, Inc. v. Chugai Pharm. Co.*, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991); *In re Fine*, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988); *In re Wilson*, 165 USPQ 494, 496 (C.C.P.A. 1970).

A *prima facie* case of obviousness must also include a showing of the reasons why it would be obvious to modify the references to produce the present invention. See *Ex parte Clapp*, 277 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). The Examiner bears the initial burden to provide some convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings. *Id.* at 974.

Where the cited art is a single reference disclosing a large genus, and there are no express teachings that would have motivated

the claimed selection, and there are no other teachings to support the selection of the claimed species, then the claim is unobvious. See MPEP 2144.08.

Pending claims

Independent claim 1 recites a one-paste photopolymerizable composition comprising a photopolymerization initiator and a polymerizable monomer, wherein said photopolymerization initiator comprises

100 parts by mass of an α -diketone compound (A),

10 to 1000 parts by mass of an amine compound (B) and

5 to 1000 parts by mass of an s-triazine compound (C) having a trihalomethyl group as a substituent,

the amine compound (B) containing an aliphatic amine compound (B1) and an aromatic amine compound (B2) at a mass ratio of B1:B2 = 3:97 to 97:3.

Analysis

In the presently claimed application, the only basis for the rejection is the single prior art reference, EP '043, which is Applicants own teaching. The genus for the claimed photopolymerization initiators taught by EP '043 is just a long laundry list of different compounds. One of ordinary skill in the art would not have been provided with any motivation or suggestion to make the specifically claimed combination of components.

In particular, the claimed photopolymerization initiator is comprised of an α -diketone compound (A), an amine component (B) comprising the aliphatic amine compound (B1) and an aromatic amine compound (B2), and the s-triazine compound (C). The combination of these four components (A), (B1), (B2) and (C) when fabricated in the claimed ratio results in a photopolymerizable composition that is highly stable against weak light such as environmental light that has an intensity at 360 to 500 nm of smaller than 1 mW/cm².

However, if even one of the four compounds (A), (B1), (B2) and (C) is lacking, the desirable and unexpected feature of preservation stability is lost. In other words, to prepare the composition of the present invention as described above, it is necessary to select a very limited and unobvious combination of

components selected from many polymerization initiators and to use those polymerization initiators in a particular ratio.

Although EP '043 teaches a broad variety of chemical polymerization initiators and photopolymerization initiators, the reference fails to teach the specifically claimed combination. For example, the paragraph [0071] of D1 describes the following five kinds of chemical polymerization initiators:

- 1) Organic peroxide and amine;
- 2) Organic peroxide, amine and sulfinic acid;
- 3) Acidic compound and aryl borate;
- 4) Barbituric acid; and
- 5) Alkylborane.

In the same paragraph [0071], the reference also teaches the following four kinds of photopolymerization initiators:

- 6) Aryl borate and photo acid generator;
- 7) α -diketone and tertiary amine;
- 8) Thioxanthone and tertiary amine; and
- 9) α -aminoacetophenone.

The reference further exemplifies in paragraph [0078], a halomethyl group-substituted s-triazine compound and a diphenyl iodonium salt compound, and teaches in paragraph [0073] an aliphatic amine and an aromatic amine as tertiary amines.

But in order to prepare the composition of the present invention, the claimed four compounds (A), (B1), (B2) and (C) must be used. For example, one of ordinary skill in the art in order to make the claimed invention must have been provided with some motivation or suggestion to select only the photopolymerization initiators 6) to 9) among the many polymerization initiators disclosed in the reference but at the same not have been motivated to select any of the chemical polymerization initiators 1) to 5). Had one of ordinary skill in the art selected a chemical polymerization initiator, polymerization would have immediately started the moment the polymerizable monomer was mixed with the chemical polymerization initiator and resulted in a two-paste type polymerizable composition rather than the presently claimed one-paste composition.

Similarly, one of ordinary skill must have also been motivated to select a combination of the photopolymerization initiators 6) and 7) out of the photopolymerization initiators 6) to 9) wherein it would be required that further motivation be shown for the selection of the photopolymerization initiator 6) wherein the halomethyl group-substituted s-triazine compound is selected as the photo acid generator. Again, motivation must also be provided to select the photopolymerization initiator 7) wherein an aliphatic

amine and an aromatic amine as the tertiary amines are both used.

However, it is clear from the lack of any instructive teachings in EP '043 that one of ordinary skill in the art at the time of invention would not have been provided with any of the motivation or suggestion discussed. In fact, many polymerizable compositions concretely disclosed in the Examples of EP '043 are all of the two-paste variety which requires the use of a chemical polymerization initiator.

The significance of a chemical polymerization initiator is that preservation stability is not an issue in two-paste type compositions. Compositions of the two-paste type are prepared just prior to being cured and therefore do not need to be stable for any length of time. Examples of EP '043, however, solely relate to two-paste compositions. Hence, EP '043 could not have possibly provided any motivation or suggestion to one of ordinary skill in the art seeking to make a one-paste composition having good stability or shelf life.

Applicants note that any possible admonition that it would have been "obvious to try" to vary the claimed limitations is improper. This is because in some cases, what would have been "obvious to try" would have been to vary all parameters or try each of numerous choices until one possibly arrived at a successful

result. Since EP '043 fails to provide any indication that only the four claimed components result in preservation stability, it would not have been obvious to try to make the presently claimed invention. See *In re O'Farrell*, 853 F.2d 894, 903, U.S.P.Q.2d 1673, 1681 (Fed. Cir. 1988).

Applicants further note that the claimed limitations are not mere optimization of results effective variables because one of ordinary skill in the art would not have expected that the claimed four components would impart desirable preservation stability characteristics over the laundry list of compounds generally disclosed by EP '043. See *In re Antoine*, 195 UPSQ 6 (C.C.P.A. 1977).

In view of all the above, Applicants respectfully submit that the *prima facie* case of obviousness has not been established. But assuming *arguendo* that a *prima facie* case of obviousness has been made out, Applicants provide clear evidence of unexpected results rebutting the presumption. In particular, Tables 4-6 on pages 46, 48 and 50 of the specification show that only the specifically claimed combination of components results in a photopolymerization initiator having the desirable feature of being highly stable when exposed to environmental or ambient light.

Only the presently claimed combination results in excellent

preservation stability properties wherein polymerization is completed in a very short period of time after being irradiated with highly intense light. For example, the Experiments reported in Table 4 show that absence of a triazine compound or both a triazine compound and an aliphatic amine failed to produce the strength properties required of the composition. Table 5 shows that the absence of an aromatic amine or an aliphatic amine also failed to produce the required strength properties. Table 6 further shows the absence of aromatic amine, aliphatic amine or triazine compounds result in inferior compositions.

In view of the evidence, it is clear that only the presently claimed photopolymerization initiator comprised of an α -diketone compound (A), an amine component (B) comprising the aliphatic amine compound (B1) and an aromatic amine compound (B2), and the s-triazine compound (C) results in preservation stability while retaining the required strength properties.


Accordingly, Applicants respectfully submit that the presently pending claims are unobvious over EP '043 and request withdrawal of the outstanding rejection under § 103.

CONCLUSION

In light of the foregoing, Applicants submit that the application is now in condition for allowance. The Examiner is therefore respectfully requested to reconsider and withdraw the rejection of the pending claims and allow the pending claims. Favorable action with an early allowance of the claims pending is earnestly solicited.

Respectfully submitted,

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